

An AOM Clinical Practice Guideline Summary

Hypertensive Disorders of Pregnancy

Hypertensive disorders of pregnancy (HDP) are a major cause of poor pregnancy outcome in Canada and internationally. HDP encompasses a spectrum of conditions, including pre-existing hypertension, gestational hypertension and preeclampsia. These conditions range in severity from a mild increase in blood pressure at term to multisystem conditions with the potential for significant harm. For many of the clinical manifestations of HDP, optimal strategies for prevention and management have yet to be determined, with delivery of the fetus being the only definitive treatment. Despite extensive research, the onset of hypertension during pregnancy has proven difficult to predict.

This summary provides easy access to some of the most essential content of *AOM CPG No. 15: Hypertensive Disorders of Pregnancy* and is intended for use in conjunction with the full-length CPG. For a complete analysis of the research relevant to HDP and midwifery practice along with all citations, readers are strongly encouraged to refer to the full CPG.

Definition and Classification of HDP

See *Society of Obstetricians and Gynaecologists of Canada (SOGC) Clinical Practice Guideline No. 206: Diagnosis, Evaluation and Management of the Hypertensive Disorders of Pregnancy*.

- **Hypertension** in pregnancy is defined as a $\text{dBp} \geq 90$ mmHg, based on the average of at least two measurements taken using the same arm.
- **Severe hypertension** is defined as a $\text{sBP} \geq 160$ mmHg or a $\text{dBp} \geq 110$ mmHg.
- **Proteinuria** is defined as a urinary protein measurement equal to or greater than 0.3g/day in a 24-hour urine collection or ≥ 30 mg/mmol urinary creatinine in a spot urine sample.

Hypertensive disorders of pregnancy should be classified as *pre-existing or gestational hypertension* based on gestational age (GA) at diagnosis.

- **Pre-existing hypertension:** diagnosis before pregnancy or prior to 20 weeks' GA. In individuals with pre-existing hypertension, **preeclampsia** is defined by the presence of one or more of the following at or after 20 weeks' GA:
 - » resistant hypertension (≥ 3 antihypertensive agents required to control BP)
 - » new or worsening proteinuria
 - » one or more other adverse conditions*
- **Gestational hypertension:** Diagnosis at or after 20 weeks' GA. In individuals with gestational hypertension, **preeclampsia** is defined by the presence of one or both of:
 - » new-onset proteinuria
 - » one or more of the other adverse conditions*
- **Severe preeclampsia** is defined as preeclampsia with onset before 34 weeks' GA, with heavy proteinuria or one or more other adverse conditions.*
- **HELLP** syndrome is characterized by hemolysis, elevated liver enzymes and low platelet count. It can occur either with or without other typical symptoms of preeclampsia.
 - *Adverse conditions associated with preeclampsia
- Maternal symptoms: persistent or new/unusual headache, visual disturbances, persistent abdominal or right upper quadrant pain, severe nausea or vomiting, chest pain or shortness of breath.
- Maternal signs of end-organ dysfunction: seizures, severe hypertension, pulmonary edema, or suspected placental abruption.
- Fetal morbidity: oligohydramnios, intrauterine growth restriction, absent or reversed end-diastolic flow in the umbilical artery by Doppler velocimetry, or intrauterine fetal death.
- Abnormal maternal laboratory testing:
 - » elevated serum creatinine (see below)
 - » elevated AST, ALT or LDH with symptoms (see below)
 - » platelet count $< 100 \times 10^9/\text{L}$
 - » serum albumen < 20 g/L

NORMAL VALUES IN PREGNANCY			
	First trimester	Second trimester	Third trimester
Creatinine (µmol/L)	35-62	35-71	35-80
AST (SGOT) (U/L)	3-23	3-33	4-32
ALT (SGPT) (U/L)	3-30	2-33	2-25
LDH (U/L)	78-433	80-447	82-524

Source: James D, Steer P, Weiner C et al. *Pregnancy and laboratory studies: a reference table for clinicians*. *Obstet Gynecol*. 2010 Apr;115(4):868

Incidence of HDP

Approximately 1% of pregnancies in Canada are affected by pre-existing hypertension, 5% to 6% by gestational hypertension without proteinuria, and 1% to 2% by preeclampsia.

Progression and Prognosis

In some cases, individuals who have been diagnosed with gestational hypertension will develop preeclampsia. The likelihood of progression decreases with GA at diagnosis,

falling from 50% when new hypertension is diagnosed prior to 30 weeks' GA to 10% when diagnosed at or after 36 weeks' GA. Individuals with pre-existing hypertension experience a 10% to 20% risk of developing preeclampsia. Preeclampsia is a multisystem disease with variable progression. The majority of cases of preeclampsia in healthy primiparas are mild and associated with little increased risk of adverse pregnancy outcome; approximately 75% are diagnosed near term or intrapartum.

Factors Associated with the Development of Hypertension in Pregnancy

The highest volume and quality of research on the prediction of hypertension in pregnancy focuses on factors associated with preeclampsia. There has been no consensus and clear evidence to date about what criteria should be considered in determining a clients' risk of developing preeclampsia. Midwives are encouraged to consider the client's clinical picture and risk criteria developed according to expert consensus by other organizations (NICE, SOGC) in decisions related to client risk status and whether or not to undertake any potential preventative measures.

SELECTED RISK FACTORS FOR DEVELOPING PREECLAMPSIA

The table below lists risk factors identified in meta-analysis of cohort studies.

Source: Duckitt K, Harrington D. *Risk factors for pre-eclampsia at antenatal booking: systematic review of controlled studies*. *BMJ* 2005 03/12:33(7491):565

Risk factor	Unadjusted pooled relative risk (95% CI)
Past history	
Antiphospholipid antibodies* vs. none	9.72 (4.34 – 21.75)
Previous preeclampsia vs. no previous preeclampsia	7.19 (5.85 – 8.83)
Pre-existing diabetes vs. none	3.56 (2.54 – 4.99)
Family history of preeclampsia vs. no family history of preeclampsia	2.90 (1.70 – 4.93)
Raised pre-pregnancy BMI vs. normal pre-pregnancy BMI**	2.47 (1.66 – 3.67)
Current pregnancy	
Twin pregnancy vs. singleton pregnancy	2.93 (2.04 – 4.21)
Primiparity vs. multiparity	2.91 (1.28 – 6.61)
sBP ≥130 mmHg at booking vs. sBP <130 mmHg at booking	2.37 (1.78 – 3.15)
dBp ≥ 80 mmHg at booking vs. dBp <80 mmHg at booking	1.38 (1.01 – 1.87)
Demographic factors	
Age ≥ 40 vs. < 40 (primiparas)	1.68 (1.23-2.29)
Age ≥ 40 vs. < 40 (multiparas)	1.96 (1.34-2.87)

*lupus anticoagulant and/or anticardiolipin

** Elevated BMI was defined variably in the studies included

For further information:

SOGC Clinical Practice Guideline No. 206: Diagnosis, Evaluation, and Management of the Hypertensive Disorders of Pregnancy.

National Institute for Health and Clinical Excellence (NICE) Clinical Guideline 107. Hypertension in pregnancy: The management of hypertensive disorders during pregnancy

Prediction and Prevention of HDP

- **Predictive Tests** At present, there is no single test that accurately predicts the development of preeclampsia. Research on tests that combine clinical and laboratory findings is ongoing.
- **Low-dose Aspirin (LDA)** Daily use of LDA (81 mg) appears to reduce the risk of preeclampsia in individuals at increased risk of developing the condition. While LDA seems to have the greatest benefit when it is started before 16 weeks' GA, there is no evidence to suggest there are risks associated with starting LDA at a later gestational age. Informed choice discussions related to over-the-counter drugs should be documented in the same manner as prescribed drugs recommended or given by the midwife, with the dose, route and frequency recorded in the client's chart.
- **Calcium** Calcium supplementation appears to reduce the risk of hypertension and/or preeclampsia, though this effect seems to be strongest in individuals whose dietary calcium intake is low and/or who are at increased risk of preeclampsia. Clients with calcium intake <1000 mg/day may consider increasing their daily calcium intake to 1000 – 2500 mg/day by consuming additional foods high in calcium (i.e. dairy products or fortified soy beverages) or through supplementation.
- **Vitamin C and E** High-quality evidence suggests vitamin C and E supplementation does not reduce the risk of preeclampsia or its complications.
- **Nutritional/Micronutrient Supplementation** Current research does not suggest fish oil supplementation is effective in preventing HDP. There is insufficient evidence to recommend vitamin B6, zinc, magnesium, folic acid or garlic supplementation for the prevention of HDP.

- **Lifestyle Modification** There is insufficient evidence to make conclusions about the effects of exercise and/or rest on the prevention of HDP.

ANTENATAL CONSIDERATIONS

Measuring and Recording BP

- Use a calibrated device and a cuff of appropriate size
- Ensure client is relaxed, with arm supported at heart level
- Determine sBP by the onset of palpation or appearance of clear tapping sounds (Korotkoff phase I)
- Measure dBP as the disappearance of sounds (Korotkoff phase V)
- Read blood pressure to the nearest 2 mmHg

Assessment of Proteinuria

The optimal frequency, ideal method and ultimate value of screening for urinary protein have not been established. Current opinion suggests dipstick testing is an appropriate method of screening for preeclampsia in the midwifery setting. A negative dipstick reading does not necessarily rule out proteinuria, and a positive urine dipstick reading, in the absence of new hypertension, is prone to false positives. Midwives should provide adequate education to clients about urine collection and urinalysis, including how to read urine dipsticks and what to do in the case of an elevated reading.

A urine dipstick value $\geq +1$ is considered to be equivalent to ≥ 0.3 g/L (≥ 0.3 g/day by 24-hour urinalysis). If urinary protein equivalent to ≥ 0.3 g/L is found using urine dipstick, a midwife may consider whether or not retesting at a later time by urine dipstick or facilitating a laboratory investigation such as protein/creatinine ratio or 24-hour collection is warranted based on the client's overall clinical picture (presence of leucorrhoea, dehydration etc).

It is suspected that protein readings from dipstick analysis may also be contaminated by leucorrhoea, blood or semen, although no research is available to substantiate this possibility. Midwives may find that recommending the use of an obstetrical towelette prior to voiding may reduce contamination and aid in obtaining an accurate result.

For clients who are positive for urinary protein upon dipstick analysis, and have confirmed hypertension, further assessment and consultation with a physician are appropriate.

Other signs and symptoms

Fetal manifestations of preeclampsia may precede, coincide with, or occur in the absence of maternal signs or symptoms

of preeclampsia. The incidence of IUGR in preeclamptic pregnancies is estimated at 30%. Midwives should consider preeclampsia as a differential diagnosis while evaluating clinical findings suggestive of SGA or IUGR. Ultrasound evaluation of growth and fetal well-being should be considered when HDP is suspected as part of preparation for consultation.

SYMPTOMS OF PREECLAMPSIA

- Persistent headache
- Visual disturbances (blurring, flashing, dark spots in the field of vision)
- Epigastric pain/right upper quadrant pain
- Nausea and/or vomiting
- Chest pain/shortness of breath

Management of HDP

Treatment options for HDP vary according to diagnosis, severity, gestational age, the client's wishes and the consultant's recommendations. Midwives may facilitate informed choice discussions, monitoring or provision of supportive care to their clients depending on the severity of the HDP and community standards. For further details regarding the management of HDP, midwives are encouraged to consult the SOGC's *Clinical Practice Guideline No. 260: Diagnosis, Evaluation and Management of the Hypertensive Disorders of Pregnancy*.

INTRAPARTUM CONSIDERATIONS

While there is consensus that heightened maternal and fetal surveillance is warranted in individuals with HDP, the optimal content and frequency of such activities has yet to be determined.

There is little research on optimal timing of birth in individuals who have mild or moderate hypertension and/or preeclampsia between 34 and 37 weeks' GA.

Current research does not permit straightforward conclusions about the circumstances to which early induction of labour or expectant management strategies are best suited for individuals ≥ 37 weeks' GA. The Netherlands-based HYPITAT trial, while small, suggested improved maternal outcomes with induction of labour at 37 weeks' GA in study participants with gestational hypertension or mild preeclampsia. Progression to severe disease (severe hypertension, severe proteinuria, HELLP syndrome, eclampsia, lung edema, severe postpartum hemorrhage or thromboembolic disease) occurred in 23% of the induction group and 36% of the expectant management group,

corresponding to a relative risk of 0.64 (95% CI 0.51-0.80) and an absolute risk reduction of 13% among the induction group.

This trial was criticized for using a composite measure of poor maternal outcome. The outcomes included in the measure of severe disease were less conclusive when analyzed individually. While the induction group experienced an absolute risk reduction of progression to severe sBP and dBp, there was no statistically significant difference between induction and expectant management groups in risk of any other outcome included in the composite measure of severe disease, nor any of the neonatal outcomes assessed (fetal death, Apgar score <7 at 5 minutes, arterial pH <7.05 , admission to intensive care). (For further information, see Koopmans CM, Bijlenga D, Groen H, et al. *Induction of labour versus expectant monitoring for gestational hypertension or mild pre-eclampsia after 36 weeks' gestation (HYPITAT): a multicentre, open-label randomised controlled trial*. Lancet. 2009 Sep 19;374(9694):979-88.)

Provided it is not contraindicated, epidural analgesia is appropriate in clients with HDP. Given the increased risk of coagulopathy and thrombocytopenia with HDP, active management of the third stage of is recommended. As ergometrine (ergonovine maleate) is associated with increased risk of elevated blood pressure, oxytocin should be used as prophylaxis for active management of the third stage.

POSTPARTUM AND LONG-TERM CONSIDERATIONS

Case reports on non-steroidal anti-inflammatories (NSAIDs) used to manage postpartum pain for individuals with HDP suggest that use of NSAIDs may have the potential to worsen HDP (due to the side effects of hypertension experienced by some users) and should therefore be used judiciously.

CONCLUSION

HDP includes a range of conditions of varying etiology, severity and symptoms. While these conditions rarely result in long-term harm for mother or baby, HDP is a major contributor to morbidity and mortality. The midwife plays a key role in monitoring for elevated blood pressure and other signs and symptoms of HDP throughout the pregnancy, intrapartum and postpartum periods. Furthermore, midwives may continue to provide monitoring and/or support to clients whose care is managed in consultation with a physician or is transferred to a consultant.

Recommendations

1. Presence or absence of known risk factors for preeclampsia should be determined and communicated to clients early in care. Consultations should be arranged as indicated by the CMO's CTCS (IIIA/B)
2. In the absence of consensus and clear evidence about what criteria should be considered in determining a client's level of preeclampsia risk, midwives are encouraged to consider the client's clinical picture and consensus-based criteria in discussions related to client risk status and whether or not to undertake any potential preventive measures. (IIIB)
3. If consistent with community standards, offer low-dose aspirin (81 mg/day) to clients at increased risk of developing preeclampsia, beginning once the client's increased risk has been identified (ideally before 16 weeks' GA), and continuing until delivery. (IA)
4. Inform clients whose dietary calcium intake is below recommend levels (< 1000 mg/day) and clients who are at increased risk of developing hypertension that calcium supplementation appears to reduce the risk of preeclampsia. Recommend increased calcium intake (1000-2500 mg/day) through calcium supplementation or by consuming additional servings of foods high in calcium (equivalent to 1000-2500 mg/day). (IA/B)
5. Discuss signs and symptoms of preeclampsia during the prenatal period (see "Symptoms of Preeclampsia" above) and ensure that clients are aware of how to contact their midwife in the event these symptoms arise. (IIIA)

Recommended midwifery actions when elevated blood pressure is detected in the absence of proteinuria:

6.
 - a) For non-severe hypertension (dBP < 110 mmHg), at least two serial BP measurements using the same arm should be recorded before a diagnosis of hypertension is made. (II-2B)
 - b) If dBP is ≥ 90 mmHg and < 110 mmHg and dipstick urine testing is negative for proteinuria, blood pressure should be reassessed by repeat measurement. Midwives will use their judgment to determine an appropriate interval between measurements, based on the client's gestational age, risk factors and presence of other signs and/or symptoms of preeclampsia.
 - c) Conducting the second reading in the home environment is recommended when possible to rule out white coat hypertension. (II-2B)
 - d) If an automated BP measurement device has been used for the first measurement, perform the second reading using a mercury sphygmomanometer or an aneroid device. (II-2B)
 - e) Urinary protein should also be reassessed by dipstick at the time of the second BP measurement. (IIIB)
 - f) Two successive readings of a dBP of ≥ 90 mmHg require a medical consultation. (IIIA)
7. If sBP is ≥ 140 mmHg and < 160 mmHg and dBP < 90 mmHg, and dipstick urine testing is negative for proteinuria, assess whether the client has risk factors for transiently elevated sBP (e.g. stress, caffeine, recent exercise) and determine whether or not to reassess the client's BP within a shorter time interval based on the client's clinical picture, while advising the client to contact her midwife if any other signs and symptoms of preeclampsia develop in the meantime. As elevated sBP may be a precursor to the subsequent development of diastolic hypertension, a higher index of suspicion may be warranted for these clients. (IIIB)
8. For severe hypertension (dBP ≥ 110 mmHg, sBP ≥ 160 mmHg), with or without proteinuria, further investigation and/or prompt assessment in a hospital setting and consultation with an obstetrician is warranted (CTCS). (IIIA)

Recommendations, cont...

Recommended midwifery actions when blood pressure is elevated and in the presence of proteinuria:

9. a) If dBP is ≥ 90 mmHg and < 110 mmHg and proteinuria (equivalent to ≥ 0.3 g/L or more or $\geq +1$ on urine dipstick) is present, midwives should use their clinical judgment to determine whether or not a reassessment should occur at home or in hospital the same day to confirm hypertension and presence of proteinuria. (IIIB)
- b) If hypertension and proteinuria are confirmed, further investigation and/or medical consultation and transfer of care is warranted. (IIIA)

Recommended midwifery actions when urinary protein is elevated:

10. a) For urine dipstick values equivalent to ≥ 0.3 g/L ($\geq +1$ on urine dipstick) in addition to other signs or symptoms of preeclampsia, further investigation and/or a prompt medical consult should be arranged. (IIIA)
 - b) If a urine dipstick value equivalent to ≥ 0.3 g/L ($\geq +1$ on urine dipstick) is noted in the absence of elevated blood pressure or other signs and symptoms of preeclampsia, repeat the dipstick urinalysis. Midwives will use their judgment to determine an appropriate interval between measurements, based on the client's gestational age and risk factors. Midwives may suggest that clients use an obstetric towelette before producing the second sample to reduce the likelihood of a false-positive result. If urine dipstick reading remains equivalent to ≥ 0.3 g/L, further investigation and/or a medical consult is indicated. (IIIC)
11. Active management of the third stage of labour with oxytocin is recommended and should be offered to clients with HDP. (IA)
 12. Ergonovine maleate should be avoided in the prevention and treatment of PPH in clients with HDP if other suitable uterotonic drugs are available. (II-3D)
 13. For clients with HDP whose blood pressure remains elevated upon discharge from hospital, midwives should ensure that a plan is in place with the consulting physician for follow-up consultation in the postpartum period if the client's blood pressure remains elevated and/or increases. (III-B)
 14. Monitor blood pressure at all regularly scheduled postpartum visits for the first 2 weeks postpartum or until blood pressure has returned to normal for 2 consecutive visits for clients who have experienced HDP. (IIIB)
 15. Following the birth, inform clients with HDP that their elevated blood pressure may take some time to resolve and that in some cases, gestational hypertension may worsen during the postpartum period (though this is relatively uncommon). Advise clients to page their midwife if signs and symptoms of preeclampsia develop in the postpartum period. (IIIA)
 16. For clients with HDP, limit use of nonsteroidal anti-inflammatory drugs (ibuprofen, naproxen, diclofenac) for management of postpartum pain. Acetaminophen is an effective alternative, though available research provides only limited information about side effects. (IIIL)
 17. Clients who have had HDP should be advised that they may be at increased risk of developing hypertension or cardiovascular disease later in life. (III-B)
 18. Midwives should discuss the positive benefits of a heart healthy diet and lifestyle with clients who have had HDP, and how these factors may mitigate development of hypertension-related disease in later life. (IB)
 19. Upon discharge from midwifery care, ensure information about a client's HDP is communicated to the primary care provider/family physician who will be providing ongoing care to the client, if applicable. (IIIB)

For a complete list of references, please see the full [HDP CPG](#).